REMARKS

Claims 1-10, 12-14, 17, 20, 22-30, 35, 37, 39, and 41-49 are in the application. Reconsideration and withdrawal of the rejections are requested in view of the following remarks.

Claims 43, 9 and 10 have been amended in view of the comments at pages 2-3 of the 4/15/05 Office Action. Claim 35 has been amended to further describe a method of the invention.

Turning to the prior art, initially, there is no motivation to combine DeGendt *et al.*, U.S. Patent No. 6,551,409 B1, with EP 782 177, for the following reasons. In DeGendt *et al.*, the wafer is fixed in place and does not move, whereas EP 782 177 is a wafer spin process. DeGendt *et al.* is an immersion process, or a moist vapor process, whereas EP 782 177 is a spray process. DeGendt *et al.* suggests processing with the wafer in a vertical position, whereas EP 782 177 suggests processing with the wafer in a horizontal position. These fundamental differences teach away from combining these two references.

More importantly though, even when combined, DeGendt *et al.* and EP 782 177 do not render the claims obvious, at least for the very basic reason that neither reference suggests the claimed liquid jet directed at the workpiece.

DeGendt *et al.* discloses two embodiments. The first is the moist gas phase process shown in Fig. 2. In this process, wafers are placed above the liquid, and are not immersed. A small amount of liquid, sufficient to fully immerse an ozone diffuser, is provided into the tank. Ozone is bubbled through the liquid, which exposes the wafers to a moist ozone ambient. Column 5, line 43 – column 6, line 3.

DeGendt *et al.* also discloses an ozone bubble immersion process. As shown in Fig. 3, the wafer is fully immersed, and ozone is bubbled up through the liquid. Column 6, lines 30-44.

DeGendt *et al.* makes no mention or suggestion of removing contaminants from a workpiece by using a liquid jet directed at the workpiece, to physically impact the workpiece.

DeGendt *et al.* also does not suggest forming a liquid boundary layer, as claimed. The immersion process in DeGendt *et al.* (Fig. 3) of course cannot involve any liquid layer. In the moist vapor process shown in Fig. 2 of DeGendt *et al.*, a thin condensation layer is described. Column 7, lines 4-9. However, in contrast to the pending claims, the layer in DeGendt *et al.* is formed via condensation, and not from a heated liquid, as claimed.

EP 782 177 describes a silicon etching process. In EP 782 177, spinning is performed to create a flow for rinsing. There is no mention in EP 782 177 of controlling a liquid layer thickness. As shown in Fig. 1 of EP 782 177, rinse water is supplied from a nozzle 11 on the side of the chamber. The nozzle is not directed at the workpiece, as claimed. Rather, the nozzle 11 sprays water parallel to the plane of the wafer. The water falls onto the wafer via gravity. There is nothing in EP 782 177 to suggest the claimed jet of liquid directed at the workpiece. The application of the rinse water in EP 782 177 is shown therein in Fig. 1, and is described as follows:

> "The etched wafer is spun and rinsed by conducting a stream of deionized liquid water onto the spinning wafer...."
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> Page 2, lines 55-59.

> "The present invention includes an anhydrous HF gas and water vapor etch process, the etching process being completed by a rinsing step which includes conducting a stream of deionized liquid water onto a spinning wafer with anhydrous HF gas, HCL gas, ozone, or mixtures thereof being present...." Page 3, lines 22-26.
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> "The rinse step may be controlled to meet the desired results by adjusting the rinse time, the spin rate, and/or the water flow rate." Page 3, lines 56-57.

Accordingly, EP 782 177 discloses use of a stream of rinse water, sprayed out in a direction parallel to the surface of the wafer. In addition, the spinning is performed to control the rinse step, without regard to the thickness of a liquid layer on the wafer.

Since neither DeGendt *et al.* nor EP 782 177 have any suggestion of a liquid jet, the claims cannot be obvious over this combination of prior art.

Claims 3 and 4 described jet pressures. The prior art applied against the claims does not disclose any jet, or any jet pressures.

Claim 8 describes spinning to help form a boundary layer. DeGendt *et al.* does not spin. EP 782 177 spins to distribute rinse water, without regard to any boundary layer.

Claims 13 and 17 describe moving the jet. The rinse water nozzle in EP 782 177 is fixed in place, and the workpiece is not facing the nozzle. Claim 14 describes the jet as substantially perpendicular to the workpiece. In EP 782 177, the rinse liquid is directed parallel to the workpiece.

Regarding the rejection of claims 35 and 49, Kunze-Concewitz, U.S. Patent No. 5,964,952, discloses spraying steam through a water film, to remove contaminants (specifically, chemical-mechanical polishing residue). The cleaning is achieved purely via the movement of the steam and water. There is no chemical reaction or oxidation, as described in claims 35 and 49. In addition, in Kunze-Concewitz, the wafer is spinning and the steam nozzle moves from side to side. In DeGendt *et al.*, on the other hand, there is no movement whatsoever during processing. DeGendt *et al.* relies purely on chemical reaction cleaning. Kunze-Concewitz relies purely on physical movement of steam or water to achieve cleaning. Since these references use entirely unrelated cleaning mechanisms, there is no suggestion anywhere to combine them, with or without EP 782 177.

Moreover, combining Kunze-Concewitz with DeGendt *et al.* would tend to destroy the utility of the DeGendt *et al.* process. In the moist gas-phase process shown in Fig. 2 of DeGendt *et al.*, the liquid layer and steam of Kunze-Concewitz (or the liquid film of EP 782 177) would block the moist ozone from contacting the wafer. This would prevent processing as intended in DeGendt *et al.* In the immersion process shown in Fig. 3 of DeGendt *et al.*, the liquid layer and steam of Kunze-Concewitz (or the liquid film of EP 782 177) simply could not be used. These factors demonstrate the inability

to reasonably combine the references, both conceptually and in terms of physical elements.

In view of the foregoing, it is submitted that the claims are in condition for allowance, and a Notice of Allowance is requested.

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Respectfully submitted,

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